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shall these deviations be viewed? Is the foliage of the sassafras passing through a period in which different forms of leaves are being tried to see which is best adapted to the surroundings? It may be that there is a tendency from the simple towards the more complex; and fig. 3 shows the form which may be finally adopted. This is a subject about which even the philosophic botanists know but little; but, when one finds these deviations from the common form, he cannot help wondering after what end the plant bearing them is striving.

BYRON D. HALSTED.

#### The thickness of the ice in New England in glacial times.

In the issue of SCIENCE for Sept. 28, Professor Wright corrects a reported statement of what he said about the depth of ice over New England, changing 600 feet to 6,000 feet, and giving as proof the well-known fact that Mount Mansfield and Washington show ice-action to a height *above sea-level* of between five and six thousand feet.

It seems to me that the depth 600 feet must be more nearly correct than 6,000 feet. The ice-sheet over New England must have had a thickness equal to the height of these mountain peaks above the level of the contiguous valleys. From the nature of the case we cannot well prove a greater thickness, though from theoretical considerations we may believe the ice to have been much thicker. 4,370 feet, the approximate difference between the top of Mount Washington and the Crawford House, must cover the greatest differences in elevation between neighboring valleys and mountains. The average thickness of the ice-sheet must have been much less (from this proof), possibly not more than 1,000 feet. This thickness would accord with what is believed to be the thickness of the ice to the north-westward.

The glacial striae and drift-boulders upon Mount Washington at an elevation of 6,000 feet do not necessarily lead to the supposition that the upper ice-surface had that level in northern New England, and a greater elevation to the north-westward; for local accumulations of snow and consequent ice must have existed about the summits of the White, Green, and Adirondack Mountains, as in Switzerland and in Greenland at the present time, and have constituted the source of much of the ice which spread southward over southern New England and New York.

L. C. WOOSTER.

Eureka, Kan., Nov. 7.

#### Museum of the Indiana university.

In the account of the burning of the museum building of the Indiana university, given in SCIENCE for July 27, are one or two errors which need correction.

The Owen collection of minerals and fossils was not entirely destroyed. Eight large cases, including the great majority of the typical specimens of David Dale Owen, were saved. The very perfect skeleton of *Megalonyx Jeffersoni* was also saved.

No specimens belonging to Yale college or to Cornell university were in the museum at the time of the fire. About two thirds of the very large collection made by Professor Gilbert on the Pacific coasts of Mexico and Central America were destroyed; the remaining third having been returned to the U. S. national museum, to which institution it belonged.

A new fire-proof museum building is to be erected at once, and the restoration of the collections lost is rapidly progressing.

D. S. JORDAN.

Bloomington, Ind.

#### THE FISH-COMMISSION BULLETIN.

*Bulletin of the U. S. Fish-Commission*, vol. ii., for 1882. [Edited by CHARLES W. SMILEY, A.M.] Washington, Government, 1883. 467 p., illustr. 8°.

IN looking over the pages of this book, we find several papers of marked scientific value, written by eminent specialists in biology and fish-culture,—articles which of themselves are sufficient to give this document a prominent place upon the book-shelves of naturalists, and to render it a valuable book of reference, especially to embryologists and fish-culturists.

The articles written by J. A. Ryder deserve prominent notice; for not only do they have an important bearing upon the subject of embryology, but they also show the importance of scientific treatment in hatching and maturing fish-eggs. The two most important papers by this author are, 1°, The absorption of the yolk in the embryo shad; 2°, Microscopic sexual characteristics of the American, Portuguese, and common edible oyster of Europe compared. Several smaller papers by the same author have especial bearing upon the successful hatching and rearing of the food-fishes of the Potomac.

The papers upon the distribution and specific character of fishes, with descriptions of new species, will be of special interest to systematic ichthyologists. A large part of the book is composed of letters of greater or less importance, written to the commissioner, mainly relating to the movements of fish in certain districts. We are of the opinion that a great many of these letters might have been left out entirely, without any serious loss to science. They might at least have been judiciously cut down, and published together as a series of notes; thus giving the important points, and omitting the great preponderance of useless words and sentences which one so frequently finds in these letters. The last article in the book is entitled, "A geographical catalogue of persons who have stated that they are interested in fish-culture," by C. W. Smiley.

Sandwiched between these various papers, we find one, which, in our estimation, is grossly unfit for a scientific publication of such a high standard. The title of this article is 'Life in the sea,' by J. B. Martens. It is a translation from the Dutch; and the author is teacher of natural sciences at the seminary of St. Nikolas, Belgium. From beginning to end, it is an absurd misrepresentation of facts, and deserves the severest condemnation. For instance: we find in the introductory paragraph the statement that "life in the sea

shows still greater abundance and variety" than life on the land. We cannot understand why such an article should be translated from a foreign language at considerable expense to the commission. To say the least, it shows a lack of discretion on the part of the editor; for, were articles of a popular nature desirable, it would not be necessary to incur the expense of translating, since hundreds of popular articles, with fewer misrepresentations, and of far more scientific import, could be found in our ordinary newspapers, and published with much more credit to the commission. When, moreover, it is an open secret that there are papers of real scientific value, written by eminent naturalists, kept waiting for an opportunity of appearing in one of the Fish-commission publications by the great mass of material to be issued before them, the folly of burdening the pages of the Bulletin with material of this kind becomes only too evident.

#### BRIGGS'S STEAM-HEATING.

*Steam-heating: an exposition of the American practice in warming buildings by steam.* By ROBERT BRIGGS. N.Y., Van Nostrand, 1883. (Van Nostrand's science series.) 108 p. 24°.

THIS little volume is one of the latest issues in the 'Science series,' and is one of the most valuable of a collection of monographs which includes an unusual proportion of excellent contributions to science and to engineering literature. The author of the paper, Mr. Robert Briggs, who died just before the publication of this last of his many papers on the science and the arts of engineering, was well known, both at home and abroad, as one of the ablest writers in the profession. This paper was written as his last annual contribution to the proceedings of the Institution of civil engineers of Great Britain, of which great association he had long been a member.

The subject of steam-heating is here treated from a purely practical stand-point, and the paper is full of useful information. An historical introduction is given, in which the introduction of this method of heating dwellings is ascribed to the late Mr. Joseph Nason of Boston, who was a pupil of the celebrated Jacob Perkins. Later, Messrs. Walworth of Boston, Gregg and Morse and Professor Mapes of New York, Greenwood of Cincinnati, and Tasker of Philadelphia, were influential in perfecting the system in the United States.

In heating by steam, welded wrought-iron tubes are employed, united by a system of screw-threads, which have been brought to cer-

tain standard forms and dimensions peculiar to the trade. The size of the tubes, and their thickness, are also fixed in accordance with settled standards. Tables are given of these sizes. The forms of the various kinds of couplings and other uniting parts are prescribed by standard practice, and the author gives tables of their principal dimensions.

The steam-boilers in use in steam-heating are usually, in the United States, either the common horizontal tubular boiler, or that form of the so-called sectional boiler known as the 'Babcock & Wilcox.' Both of these boilers are stated to be practically safe from disastrous explosion. Probably one-half of all the boilers in use are of the first type.

The two methods of heating most in vogue are that in which 'live' steam is carried direct from the boiler to the heating-pipe, and that in which 'exhaust-steam' from a steam-engine is employed. Both systems are often in use together. Several methods of application of the former system are practised, all of which have advocates among old practitioners. Loss of heat by conduction and radiation from the heating-pipes, where such disposition of heat is likely to be objectionable, is prevented by the non-conducting coverings, such as hair-felt, porous plaster, etc.

The diffusion of heat in the apartments to be warmed is accomplished by the use of radiators. The communication of heat to the air to be warmed may be done either in the rooms to be warmed by it, or before the air enters the rooms. Direct radiation in the apartment is effected by the use either of series of pipes properly set, or of slabs of wrought or of cast iron, hollow, and strong enough to receive the pressure of steam safely. In many cases the heating-pipes are placed overhead, and this system has been found perfectly satisfactory.

Systematic ventilation is usually combined with steam-heating, and in large buildings the air-currents are produced by the action of blowing-fans. This method of heating and ventilating is often carried out upon a very extensive scale. A large office in New-York City contains 1,923,590 cubic feet of space, occupied by 1,300 people, and is heated by a system in which are used 8 boilers having 173 square feet (16 sq. m.) of grate, and 8,000 square feet (743 sq. m.) of heating-surface. The state lunatic-asylum of Indiana, at Indianapolis, contains about fifty per cent more space.

Steam-heating is now adopted in the United States for all large buildings. An appendix to Mr. Briggs's paper contains tables of the